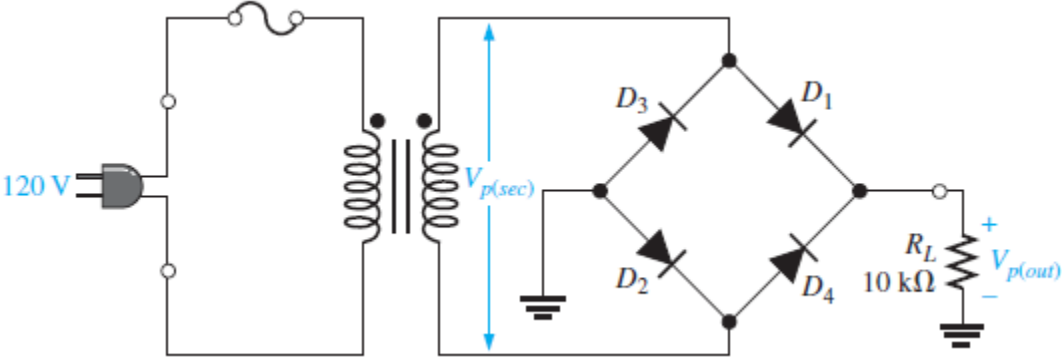
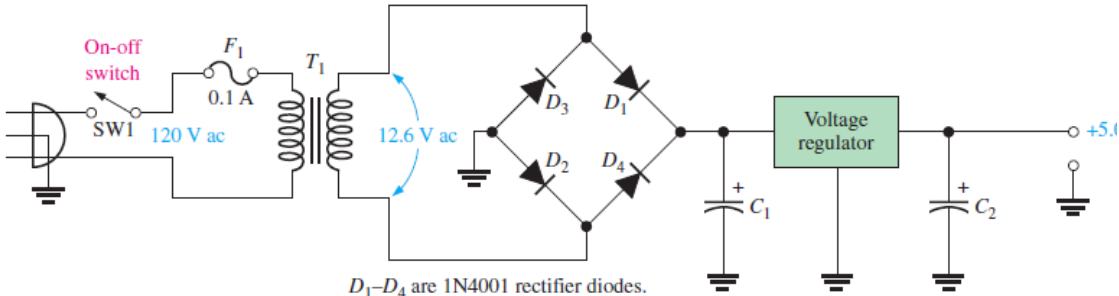


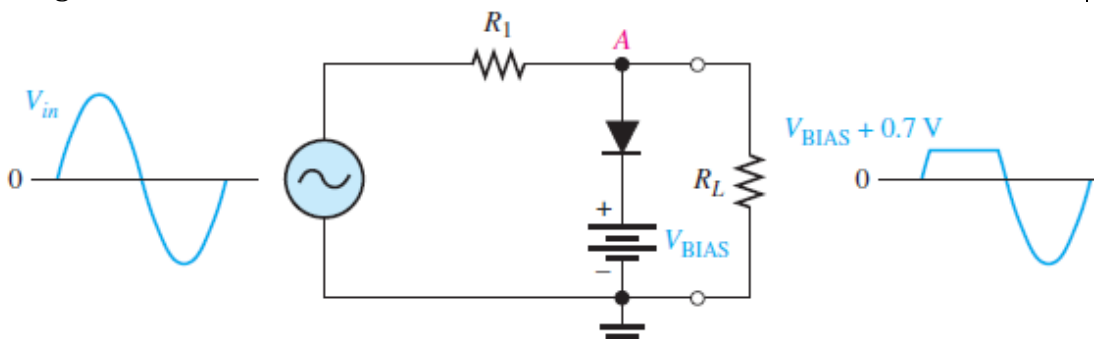
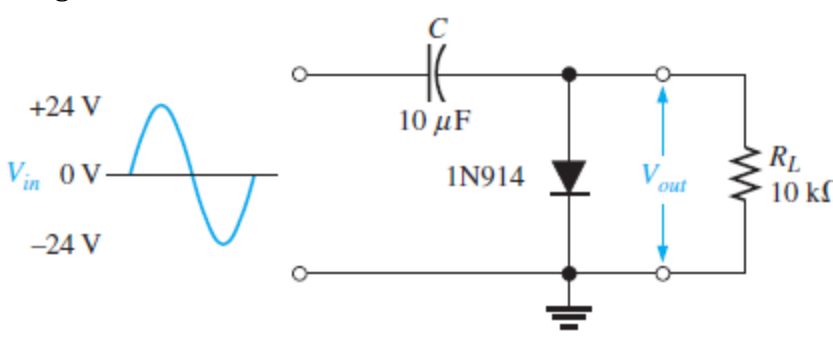
Electronic Circuits - Tutorial 04

Diode Applications II

| # | | |
|---|--|---|
| 1 | In a bridge rectifier, two diodes conduct during each half cycle of the input. | T |
| 2 | The output voltage of a filtered rectifier always has some ripple voltage. | T |
| 3 | Line and load regulation are the same. | F |
| 4 | The purpose of a clamper is to remove a dc level from a waveform. | F |

MCQ1

| # | Question | |
|---|---|---|
| 1 | <p>If the value of R_L in Figure is decreased, the current through each diode will</p>  <p>(a) increase (b) decrease (c) not change</p> | a |
| 2 | <p>If the line voltage in Figure is increased, ideally the +5 V output will</p>  <p>D_1-D_4 are 1N4001 rectifier diodes.</p> <p>(a) increase (b) decrease (c) not change</p> | c |

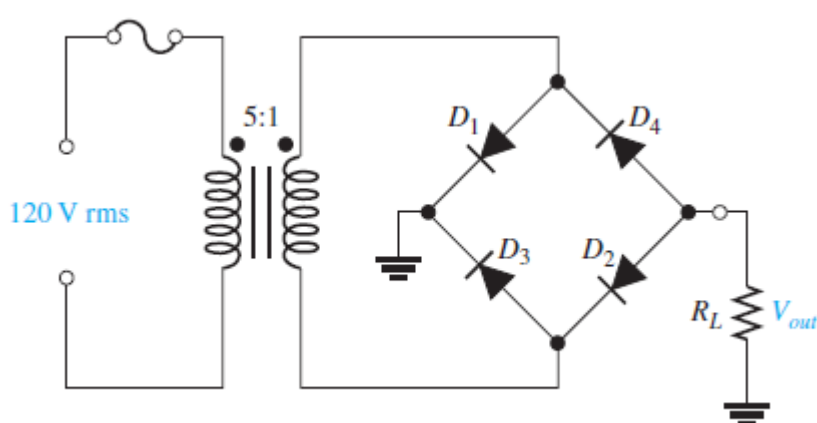
| | | |
|---|---|---|
| 3 | <p>If the bias voltage in Figure is increased, the negative portion of the output voltage will</p>  <p>(a) increase (b) decrease (c) not change</p> | c |
| 4 | <p>If the input voltage in Figure is increased, the peak negative value of the output voltage will</p>  <p>(a) increase (b) decrease (c) not change</p> | a |
| 5 | <p>When the rms output voltage of a bridge full-wave rectifier is 20 V, the peak inverse voltage across the diodes is (neglecting the diode drop)</p> <p>(a) 20 V (b) 40 V (c) 28.3 V (d) 56.6 V</p> | c |
| 6 | <p>A certain power-supply filter produces an output with a ripple of 100 mV peak-to-peak and a dc value of 20 V. The ripple factor is</p> <p>(a) 0.05 (b) 0.005 (c) 0.00005 (d) 0.02</p> | b |
| 7 | <p>If the load resistance of a capacitor-filtered full-wave rectifier is reduced, the ripple voltage</p> <p>(a) increases (b) decreases (c) is not affected (d) has a different frequency</p> | a |
| 8 | <p>Load regulation is determined by</p> <p>(a) changes in load current and input voltage (b) changes in load current and output voltage (c) changes in load resistance and input voltage (d) changes in zener current and load current</p> | b |

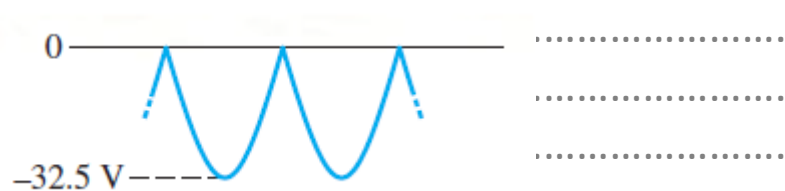


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| 9 | In a certain biased limiter, the bias voltage is 5 V and the input is a 10 V peak sine wave. If the positive terminal of the bias voltage is connected to the cathode of the diode, the maximum voltage at the anode is (a) 10 V (b) 5 V (c) 5.7 V (d) 0.7 V | c |
| 10 | The input of a voltage doubler is 120 V rms. The peak-to-peak output is approximately (a) 240 V (b) 60 V (c) 167 V (d) 339 V | a |
| 11 | When a silicon diode is working properly in forward bias, a DMM in the diode test position will indicate (a) 0 V (b) OL (c) approximately 0.7 V (d) approximately 0.3 V | c |
| 12 | In a rectifier circuit, if the secondary winding in the transformer opens, the output is (a) 0 V (b) 120 V (c) less than it should be (d) unaffected | a |
| 13 | If you are checking a 60 Hz full-wave bridge rectifier and observe that the output has a 60 Hz ripple, (a) the circuit is working properly (b) there is an open diode (c) the transformer secondary is shorted (d) the filter capacitor is leaky | b |

Problems

| | |
|---|---|
| 1 | What PIV rating is required for the diodes in a bridge rectifier that produces an average output voltage of 50 V? |
| 1 | <div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;">78.5 V</div> |

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| 2 | <p>Draw the output voltage waveform for the bridge rectifier in Figure. Notice that all the diodes are reversed from circuits shown earlier in the chapter.</p>  |
|---|---|

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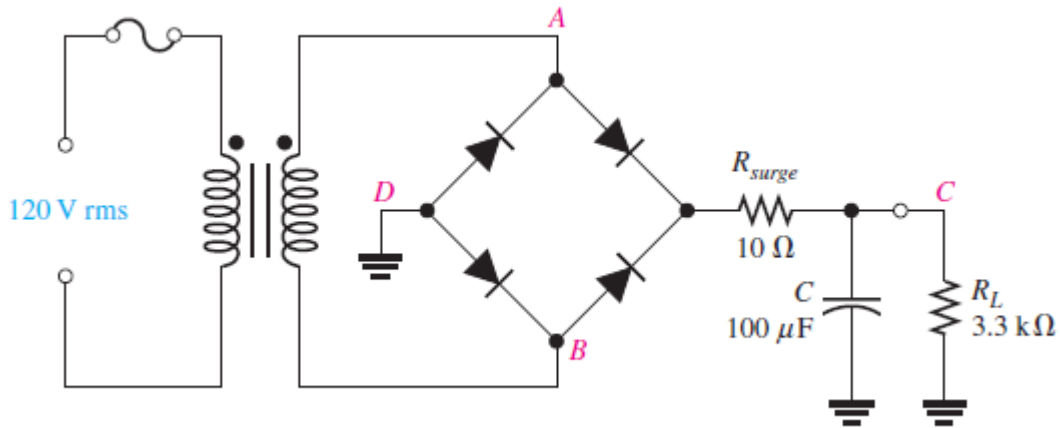
| | |
|---|--|
| 3 | A certain full-wave rectifier has a peak output voltage of 30 V. A 50 F capacitor-input filter is connected to the rectifier. Calculate the peak-to-peak ripple and the dc output voltage developed across a 600 ohm load resistance |
| 3 | <p>.....</p> <div data-bbox="342 407 935 548" style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> $V_r = 8.33 \text{ V}; V_{dc} = 25.8 \text{ V}$ </div> <p>.....</p> <p>.....</p> <p>.....</p> |

| | |
|---|---|
| 4 | What value of filter capacitor is required to produce a 1% ripple factor for a full-wave rectifier having a load resistance of 1.5K ohm? Assume the rectifier produces a peak output of 18 V. |
| 4 | <p>.....</p> <div data-bbox="363 995 802 1104" style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> 556 uF </div> <p>.....</p> <p>.....</p> <p>.....</p> |



5

Determine the peak-to-peak ripple and dc output voltages in Figure 2–98. The transformer has a 36 V rms secondary voltage rating, and the line voltage has a frequency of 60 Hz.



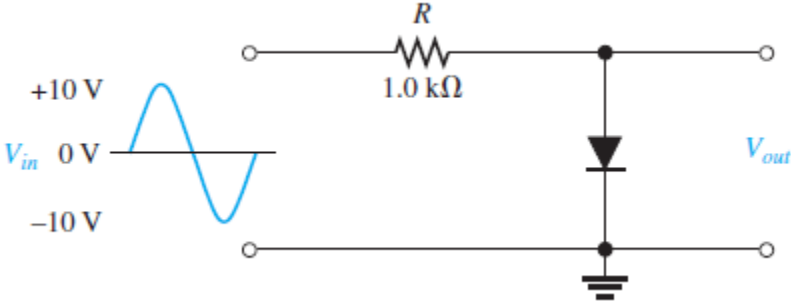
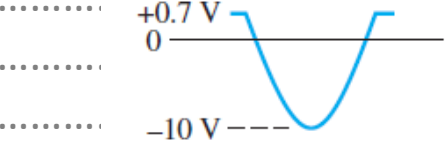
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.....
..... $V_{r(pp)} = 1.25 \text{ V}; V_{DC} = 48.9 \text{ V}$
.....
.....



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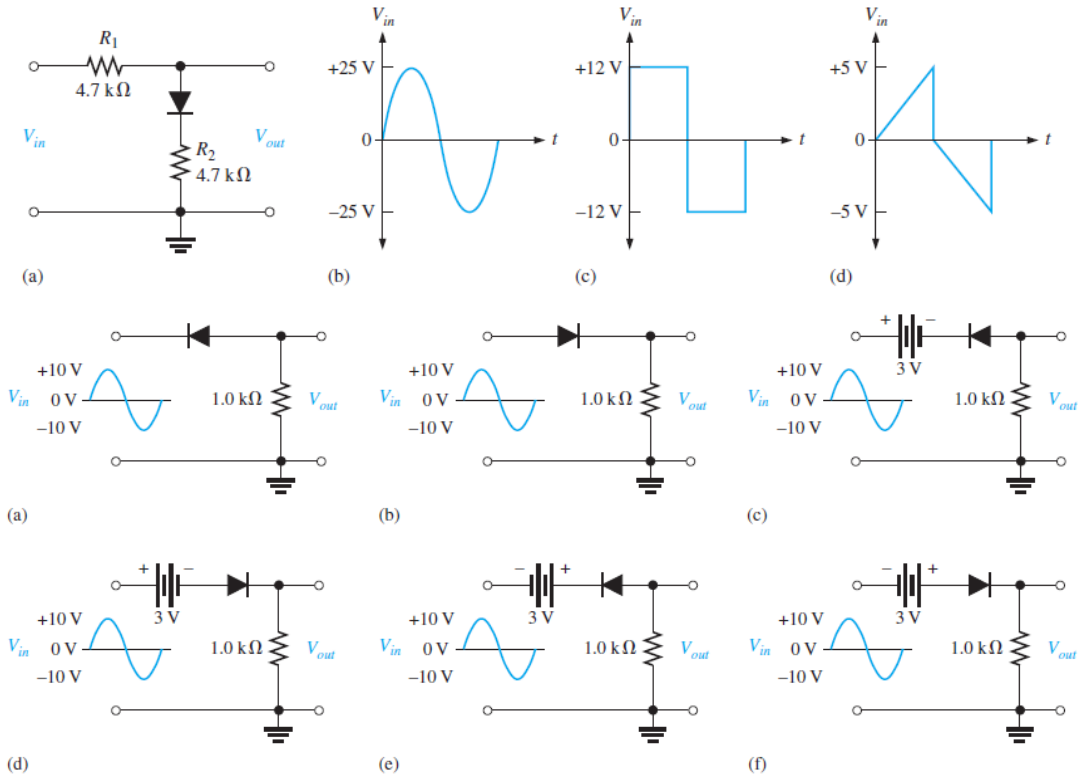
| | |
|---|---|
| 6 | If the no-load output voltage of a regulator is 15.5 V and the full-load output is 14.9 V, what is the percent load regulation? |
| 6 | <p>.....</p> <p>..... 4%</p> <p>.....</p> <p>.....</p> |

| | |
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| 7 | <p>Determine the output waveform for the circuit of Figure 2-99.</p>  |
| 7 |  <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> |

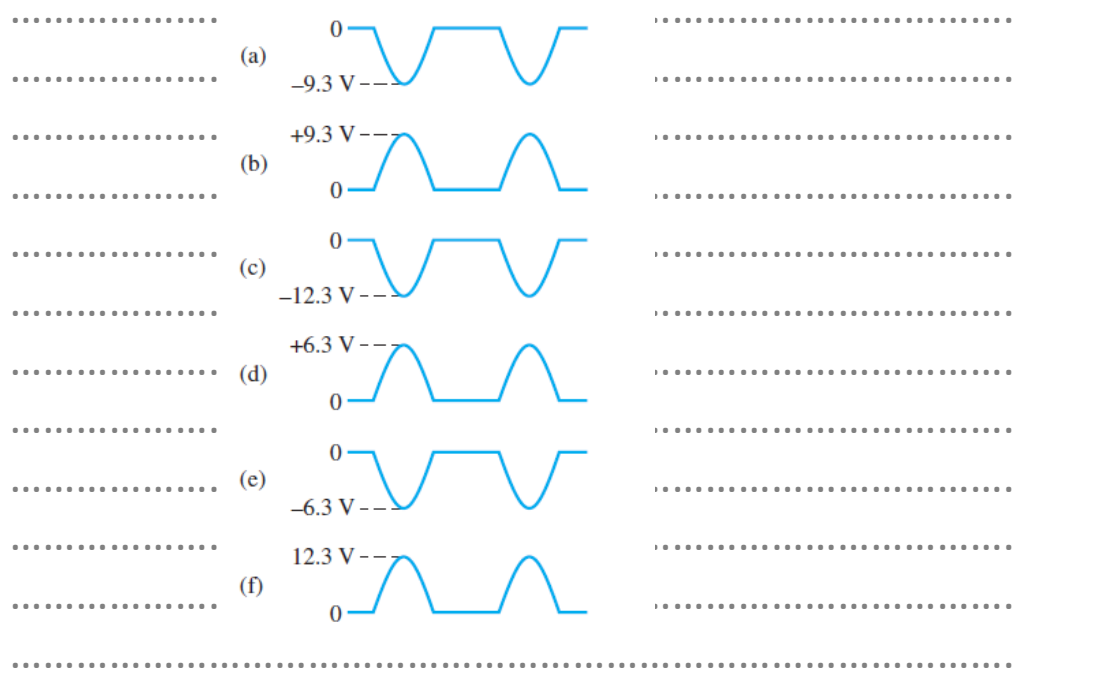


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Determine the output voltage waveform for each circuit in Figure 2-101.



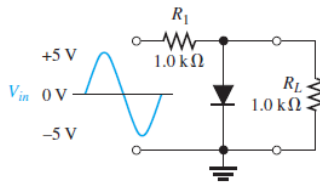
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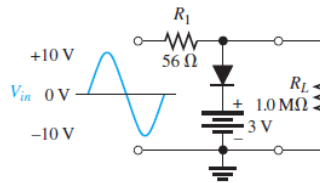


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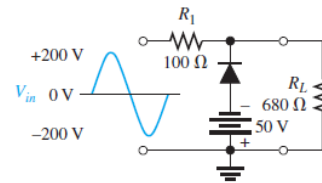
Draw the output voltage waveform for each circuit in Figure 2–103.



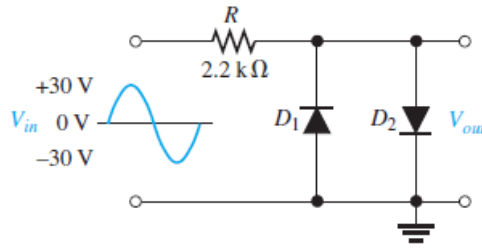
(a)



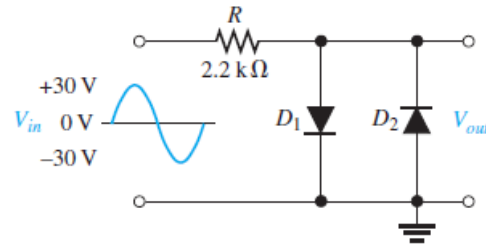
(b)



(c)



(a)



(b)

9

.....

.....

.....

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(a)

(b)

.....

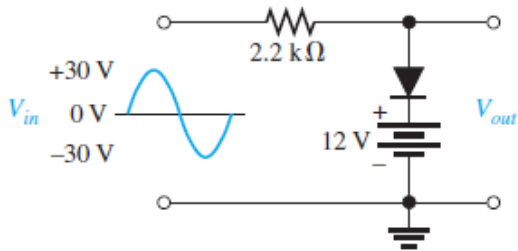
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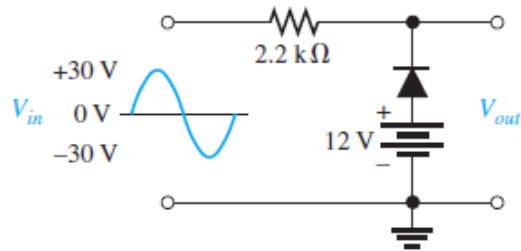


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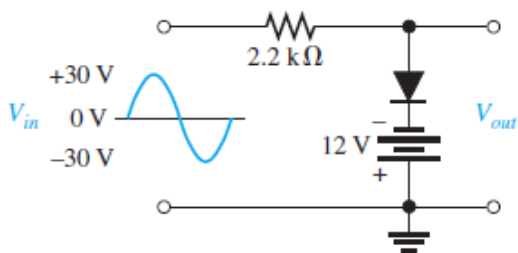
Determine the peak forward current through each diode in Figure 2–104.



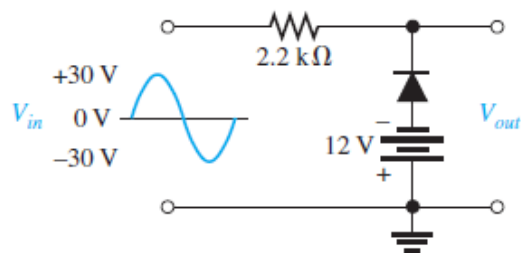
(a)



(b)



(c)



(d)

10

.....

..... (a) 7.86 mA (b) 8.5 mA

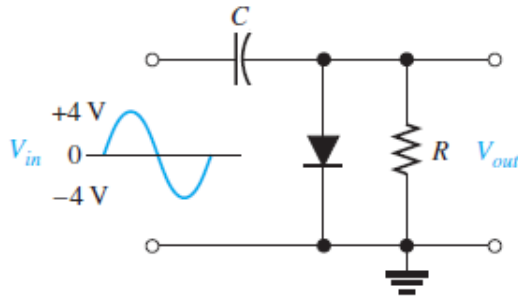
..... (c) 18.8 mA (d) 19.4 mA

.....

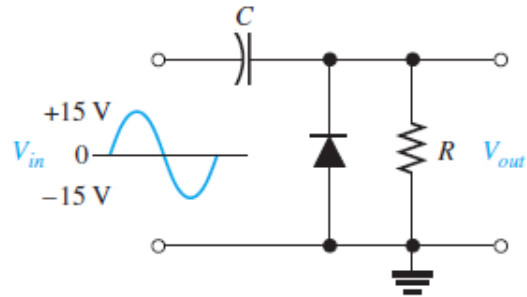


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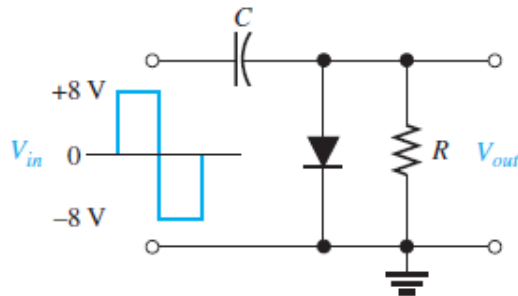
Describe the output waveform of each circuit in Figure 2–105. Assume the RC time constant is much greater than the period of the input.



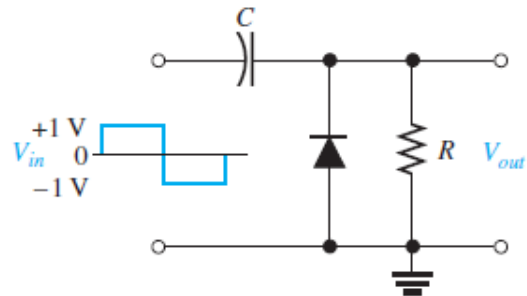
(a)



(b)



(c)



(d)

11

-
- (a) A sine wave with a positive peak at $+0.7$ V, a negative peak at -7.3 V, and a dc value of -3.3 V.
 - (b) A sine wave with a positive peak at $+29.3$ V, a negative peak at -0.7 V, and a dc value of $+14.3$ V.
 - (c) A square wave varying from $+0.7$ V down to -15.3 V, with a dc value of -7.3 V.
 - (d) A square wave varying from $+1.3$ V down to -0.7 V, with a dc value of $+0.3$ V.
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| | |
|----|--|
| 12 | A certain voltage doubler has 20 V rms on its input. What is the output voltage? Draw the circuit, indicating the output terminals and PIV rating for the diode. |
| 12 | 56.6 V |